

REMARKS

The present amendment is prepared in accordance with the new revised requirements of 37 C.F.R. § 1.121. A complete listing of all the claims in the application is shown above showing the status of each claim. For currently amended claims, inserted material is underlined and deleted material has a line therethrough.

Applicants appreciate the thoroughness with which the Examiner has examined the above-identified application. Reconsideration is requested in view of the amendments above and the remarks below.

Claims 11, 17 and 19 have been rejected under 35 USC 112, second paragraph, as being indefinite. Specifically, claim 11 is submitted to be confusing and indefinite because Applicants have recited "the positioned article is mixed at an elevated temperature and further including the steps of ceasing and mixing at an elevated temperature" without reciting the material the article is to be mixed with. In claim 11, "the mixing" lacks antecedent basis.

In claim 17, line 5, "the fluid layers" lack antecedent basis.

In claim 19, lines 5-6, "the first fluid layer" lacks antecedent basis.

The previous rejection under 35 USC 112, second paragraph have been withdrawn in view of the previous amendment.

Applicants have amended claims 11, 17 and 19 and it is respectfully submitted that the claims are now proper under 35 USC 112.

Claims 1-28 have again been rejected under 35 USC 103(a) as being unpatentable over Li (U.S. Patent No. 5,603,849) in combination with Matthews (U.S. Patent No. 5,911,837) or Berbel (U.S. Patent No. 5,989,359) and Squires et al. (U.S. Patent No. 4,619,706). The rejection as stated in Paper No. 6 is maintained.

The Examiner notes that Applicants' arguments filed December 26, 2002 have been fully considered but they are not persuasive. The Examiner notes that Applicants' argument with respect to Matthews and Berbel were not persuasive because the reactive component as claimed in claim 5 comprises water or water-soluble contaminants. The Examiner also notes that Applicants' arguments are against the references individually and that one cannot show non-obviousness by attacking references individually where the rejections are based on combinations of references. The Examiner cites *In re Keller*, 208 USPQ 871 (CCPA 1981) and *In re Merck & Co.* 231 USPQ 375 (Fed. Cir. 1986).

The Examiner also notes that Li does not teach passing the article through at least one fluid vertically, Matthews teaching lifting the wafer up from the low aqueous layer through the upper organic layer (column 5, lines 47-48, claim 1, and the document in general) and to see also Berbel Figs. 2-7.

Before we review the rejection and Applicants' invention in detail, Applicants would like to summarize the Examiner's position as set forth in Paper No. 6.

Li is cited as teaching a method and composition for cleaning silicon wafers in a two-phase liquid system and the Examiner acknowledges that Li does not teach passing the

article through at least one fluid interface horizontally, or at any other interface, the vessel, removing water, and the agitation as claimed.

Matthews is cited as teaching a process for the treatment of semiconductor wafers in a fluid and the reference is cited to teach a vessel, the drying, and two fluids as claimed. Berbel is cited as teaching a method for drying objects with fluids. Squires et al. is cited as teaching a method of stripping organic coatings from substrate using a two-phase fluid and agitation.

The Examiner concludes that it would have been obvious to one skilled in the art to use the vessel taught by Matthews and the agitation taught by Squires et al. and the Li process to obtain the claimed process. The Examiner contends that because all the references are from the same technically endeavor, which is a method of preparing a substrate by using two-phase fluids, that one skilled in the art would use the drying taught by Berbel and Matthews and the Li process to obtain the claimed process. The Examiner further concludes that this is because it is well known in the art to use two-phase fluids for removing water or liquid from the surface of a substrate.

Applicants' invention is directed to a method of preparing an article surface wherein at least two fluids of different densities are used such that a fluid interface exists between each fluid. An article is provided where one or more reactive components are on the surface which components have a greater affinity of solubility to one of the fluids. The article is positioned in one of the fluids and then the article is then treated by passing the article through the fluid interface.

All the claims in the application are directed to a method and all the claims require that a fluid interface exist between the fluids through which the article passes to prepare the article surface and that the reactive components on the surface have a greater affinity or solubility to one of the fluids. It is respectfully submitted that the prior art references do not show Applicants' invention whether taken singly or in any proper combination thereof. It is further respectfully submitted that Applicants' invention is proper under the prevailing patent law in this area as discussed below.

The Li references disclose methods and compositions for cleaning oxides and metals on surfaces of silicon wafers in a two-phase liquid system. However, and as acknowledged by the Examiner, Li does not teach passing the article through at least one fluid interface as claimed by Applicants. The silicon wafer is merely maintained in the upper non-polar organic liquid phase and metal ions are transported from the surface of the silicon wafers in the organic top layer to the polar bottom layer by diffusion. Again, there is no movement of the wafer between the phase interface of Li. It should be appreciated that this is an important feature of Applicants' invention which is not shown in Li, the primary reference.

The Matthews reference is directed to a chemical solvent drying process of semiconductor wafers which are submerged in an aqueous rinsing bath. This reference is directed to a drying process and there is no disclosure to remove reactive components on the surface using two fluids, one of which has a greater affinity or solubility to the reactive component as claimed by Applicants.

2 | Berbel is also directed to a method of drying objects with fluids. There is no disclosure in Berbel to remove reactive components on the surface using two fluids, one of which has a greater affinity or solubility for the reactive component. Berbel is merely directed to the drying of objects and not to the removing of contaminants from the surface of the object.

3 | Squires et al. is directed to a di-phase stripping bath but the patent requires that it is essential to maintain a good dispersion of solvent phase in the aqueous phase during the time the coated substrate is in contact with the stripping bath. There is no two-phase boundary separation in which the wafer or other article is passed through to remove contaminants from the surface of the article. On the contrary, Squires et al. requires that the two-phase liquid bath be agitated to maintain a uniform dispersion of the organic phase in the aqueous phase.

In summary, it is respectfully submitted that the references do not disclose nor teach Applicants' invention and actually teach away from Applicants' invention. This is the antithesis of obviousness as discussed below. Firstly, Li does not even pass the wafer or other article through a phase boundary layer and as discussed column 5, the paragraph beginning at line 4, Li states that the silicon wafers can be immersed into the non-polar or organic liquid top layer without also being immersed into the polar liquid lower layer which is increasingly contaminated with metal ions as the cleaning process progresses. Thus, Li teaches that they do not want the wafer to travel between the phases but to remain in the upper phase and that the contaminants are removed by diffusion into the

lower polar phase. Matthews and Berbel are merely directed to drying objects with fluids and Squires requires not two fluid phases which have a phase boundary separation, but that the two phases be dispersed to provide significantly improved effectiveness to remove a wide variety of organic coatings from substrates.

Regarding the patent law in this area, the Examiner is citing *in Re Keller*, 208 USPQ 871 (CCPA 1981) and *In re Merck & Co.*, 231 USPQ 375 (Fed. Cir. 1986) to rebut Applicants' arguments which are contended to be against the references individually with the Examiner contending that one cannot show non-obviousness by attacking references individually where the rejections are based on combinations of references. Applicants acknowledge that this is the patent law in this area but that the patent law also requires a number of other legal considerations with regard to rejections based on combinations of references.

As the Examiner is aware, in order for a combination of references to render an invention obvious, it must be obvious that their teachings can be combined. *In re Avery*, 186 USPQ 161 (CCPA 1975). Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching, suggestion or incentive supporting the combination. *In re Geiger*, 2 USPQ2d 1276 (CAFC 1987). Further, the mere fact that references can be combined does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Fritch*, 23 USPQ2d 1780 (CAFC 1992). Citing references which merely indicate that isolated elements and/or features decided in the claims are known is

not a sufficient basis for concluding that the combination of claimed elements would have been obvious, *Ex parte Hiyamizu*, 10 USPQ2d 1393 (BPAI 1988), absent evidence of a motivating force which would impel persons skilled in the art to do what Applicants have done. *Ex part Levengood*, 28 USPQ2d 1300(BPAI 1993). It is hornbook law that the suggestion to make the claimed composition or device to carry out the claimed process and the reasonable expectation of success must be founded in the prior art, not in Applicant's disclosure. *In re Vaeck*, 20 USPQ2d 1438 (CAFC 1991).

Now let us review the rejection in terms of the applicable patent law in this area and the cited prior art. The primary reference to Li does not even disclose the essential feature of Applicants' invention which is a requirement that the wafer or other article be moved between a phase boundary separation between fluid layers. In fact, Li teaches away from Applicants' invention by requiring that the wafer stay in one of the phases and not move between the phases. Another established patent law principle is that a reference which leads one of ordinary skill in the art away from the claimed invention cannot render it unpatentably obvious. *Dow Chem. Co. v. American Cyanamid Co.*, 2 USPQ2d 1350 (CAFC 1987). It is respectfully submitted that it is fair to conclude that because Li actually teaches away from Applicants' invention, that Li cannot render Applicants' invention unpatentably obvious under the patent law in this area.

To combine Matthews and Berbel with Li, these references are merely related to drying of a substrate and have no relation to Applicants' invention which is to remove contaminants from a wafer surface. It is respectfully submitted that the combining of these

references with Li is based on Applicants' own disclosure because why would a person skilled in the art combine Matthews and Berbel with Li which teaches a completely different process of treating an article. One would have to disregard the teachings of Li. Squires et al. is similar to Li in that it actually teaches away from Applicants' invention because a phase boundary is not employed but just the opposite in that the two fluid phases are intermittently mixed and the mixture used to contact the particle surface.

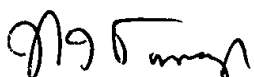
Applicants would like to emphasize that the Li reference and Squires et al. reference expressly teach away from Applicants' invention and to use these references to reject the subject matter is contrary to the patent law. *In re Grasseli et al.*, 218 USPQ 769 (CAFC 1983). Further, the Examiner's proposed modification would render the prior art version unsatisfactory for its intended purpose. *Ex parte Rosenfeld*, 130 USPQ 113 (POBA 1961), Accord, *In re Gordon*, 221 USPQ 1125 (Fed. Cir. 1984). Thus, modification of Li would be entirely contrary to the Li teaching that requires that the wafer be maintained and treated in only one phase.

In summary, it is respectfully submitted that Applicants are not merely arguing against the references individually as contended by the Examiner but respectfully submit that the references in any proper combination do not disclose or teach Applicants' invention. Two of the references expressly teach away from Applicants' invention and the primary reference to Li requires that the article not be passed between a phase boundary but only that it be maintained in a single phase to effect cleaning of the article. Based on

the patent law in this area, it is respectfully submitted that the claims are properly allowable under 35 USC 103.

It is respectfully submitted that the application has now been brought into a condition where allowance of the case is proper. Reconsideration and issuance of a Notice of Allowance are respectfully solicited. Should the Examiner not find the claims to be allowable, Applicants' attorney respectfully requests that the Examiner call the undersigned to clarify any issue and/or to place the case in condition for allowance.

Respectfully submitted,




John J. Tomaszewski
Reg. No. 26,241

DeLIO & PETERSON, LLC
121 Whitney Avenue
New Haven, CT 06510-1241
(203) 787-0595

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Name: Carol M. Thomas Date: April 16, 2003 Signature: 
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